

Claims

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3 1. A method for improved space allocation in a write anywhere file
4 system, including a file system having a set of storage blocks in a mass storage system,
5 including

6 recording an active map of said storage blocks not available for writing
7 data;

8 recording a consistency point in said file system including a consistent ver-
9 sion of said file system at a previous time, said consistency point including a copy of said
10 active map at said previous time;

11 determining for each one of a plurality of regions of said storage blocks in
12 said mass storage system, a corresponding value responsive to a number of storage blocks
13 available for writing data, in response to said active map and at least one said copy of ac-
14 tive map at a previous time; and

15 selecting at least one of said plurality of regions in response to said value.
16

17 2. A method as in claim 1, wherein said corresponding value is respon-
18 sive to a numerical comparison between a number of storage blocks available for writing
19 data in said region and a number of storage blocks available for writing data in said mass
20 storage system.

21
22 3. A method as in claim 1, wherein said active map is a bit map.

1 4. A method as in claim 1, wherein said corresponding value is respon-
2 sive to an average of the number of storage blocks available for writing data, in response
3 to said active map and at least one said copy of active map at a previous time.

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5 5. A method as in claim 1, wherein said selecting is performed on a
6 first of said plurality of regions satisfying said value in a linear search of said plurality of
7 regions.

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9 6. A method as in claim 1, wherein said corresponding value respon-
10 sive to a number of storage blocks is a binary number.

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12 7. A method as in claim 6, wherein said corresponding value deter-
13 mined for one of said regions is a binary number stored in a data block containing one or
14 more of said binary numbers each corresponding to a unique region.

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16 8. A method for improved space allocation in a write anywhere file
17 system, including a file system having a set of storage blocks in a mass storage system,
18 including

19 recording a collection of bit maps responsive to the set of storage blocks
20 available for writing data;

1 determining for each one of a plurality of regions of said storage blocks in
2 said mass storage system, a corresponding value responsive to a number of storage blocks
3 available for writing data, in response to said collection of bitmaps;

4 selecting at least one of said plurality of regions in response to said value
5 for writing said file blocks; and

6 writing a file composed of a collection of file blocks to said file system.

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8 9. A method as in claim 8, wherein writing said collection of file blocks
9 to at least one of said plurality of regions.

10
11 10. A method as in claim 8, wherein said selecting is a first of said plu-
12 rality of regions satisfying said value in a linear search of said plurality of regions.

13
14 11. A method as in claim 8, wherein said writing is a first of said plural-
15 ity of regions satisfying said value in a linear search of said plurality of regions.

16
17 12. A method as in claim 8, including additional selecting when said
18 writing does not contain an entire said collection of file blocks.

19
20 13. A method as in claim 8, wherein said corresponding value is respon-
21 sive to an average of the number of storage blocks available for writing data, in response
22 to said bit map.

1 14. A apparatus for improved space allocation in a write anywhere file
2 system, including

3 a file system that has a set of storage blocks in a mass storage system, said
4 file system records an active map of one of said storage blocks not available to write data;

5 said file system records a consistency point which includes a consistent ver-
6 sion of said file system at a previous time, said consistency point includes a copy of said
7 active map at said previous time;

8 said file system determines for each one of a plurality of regions of said
9 storage blocks in said mass storage system, a value that corresponds to said plurality of
10 regions and is responsive to a number of storage blocks available to write data, in re-
11 sponse to said active map and at least one said copy of active map at a previous time; and

12 said file system selects at least one of said plurality of regions in response to
13 said value.

14
15 15. An apparatus as in claim 14, wherein said value that corresponds to
16 said plurality of regions is responsive to a numerical comparison between a number of
17 storage blocks available to write data in said region and a number of storage blocks avail-
18 able to write data in said mass storage system.

19
20 16. An apparatus as in claim 14, wherein said active map is a bit map.

1 17. An apparatus as in claim 14, wherein said value that corresponds to
2 said plurality of regions is responsive to an average of the number of storage blocks
3 available to write data, in response to said active map and at least one said copy of active
4 map at a previous time.

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6 18. An apparatus as in claim 14, wherein said file system selects a first
7 of said plurality of regions that satisfies said value in a linear search of said plurality of
8 regions.

9
10 19. A method for improved space allocation in a write anywhere file
11 system, including a file system having a set of storage blocks in a mass storage system
12 including

13 means for recording an active map of said storage blocks not available for
14 writing data;

15 means for recording a consistency point including a consistent version of
16 said file system at a previous time, said consistency point including a copy of said active
17 map at said previous time;

18 means for determining each one of a plurality of regions of said storage
19 blocks in said mass storage system, a corresponding value responsive to a number of stor-
20 age blocks available for writing data, in response to said active map and at least one said
21 copy of active map at a previous time; and

1 means for selecting at least one of said plurality of regions in response to
2 said value.

3
4 20. A method as in claim 19, wherein said corresponding value is re-
5 sponsive to a numerical comparison between a number of storage blocks available for
6 writing data in said region and a number of storage blocks available for writing data in
7 said mass storage system.

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9 21. A method as in claim 19, wherein said active map is a bit map.

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11 22. A method as in claim 19, wherein said corresponding value is re-
12 sponsive to an average of the number of storage blocks available for writing data, in re-
13 sponse to said active map and at least one said copy of active map at a previous time.

14
15 23. A method as in claim 19, wherein said selecting is a first of said plu-
16 rality of regions satisfying said value in a linear search of said plurality of regions.

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18 24. A method as in claim 19, wherein said corresponding value respon-
19 sive to a number of storage blocks is a binary number.

1 25. A method as in claim 19, wherein said corresponding value deter-
2 mined for one of said regions is a binary number stored in a data block containing one or
3 more of said binary numbers each corresponding to a unique region.

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5 26. A method as in claim 19, wherein a collection of said corresponding
6 value is stored in one or more of said data storage blocks.